

WHAT IS CLAIMED IS:

1. A photomask material comprising at least two layers of thin inorganic coatings, said coatings changing from opaque to transparent when heated.
- 5 2. The photomask of claim 1 comprising a transparent protective overcoat.
3. The photomask of claim 2 wherein the overcoat comprises a cross-linked polymer.
- 10 4. A photomask according to claim 1 made by a method comprising:
depositing a first layer of an inorganic thin film on a substrate , the first layer consisting of a layer of a single element metal;
depositing one or more subsequent layers of another inorganic
15 material or materials; and,
imagewise exposing said layers, said exposing creating a resultant material with different etching characteristics from said first and subsequent layers.
- 20 5. A photomask according to claim 1 made by a method comprising:
depositing on a substrate a first layer of an inorganic thin film comprising a first inorganic material;
depositing one or more subsequent layers of one or more second inorganic materials; and,
25 imagewise exposing said first and subsequent layers, said exposing creating in exposed areas a contiguous layer of a resultant material having a melting point below melting points of said first and subsequent layers.

6. A photomask according to claim 5 wherein said resultant material is a eutectic alloy of said first and second materials.
7. A photomask according to claim 1 made by a method comprising:
- 5 depositing on a substrate a first layer of an inorganic thin film comprising a first inorganic material;
- depositing one or more subsequent layers of one or more second inorganic materials; and
- imagewise exposing said first and subsequent layers, said exposing
- 10 causing one or more reactions with surrounding gases to create one or more oxides, nitrides or hydrides of an alloy of materials of said first and subsequent layers, said reactions creating a resultant material having different etching characteristics from any of said materials of said first and subsequent layers.
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8. A photomask according to claim 4 wherein said resultant material has optical transmission characteristics different from optical transmission characteristics of the inorganic materials of the first and subsequent layers.
- 20 9. A photomask according to claim 1 made by a method comprising:
- providing on the substrate a first layer of a first material and a second layer of a second material, the first and second materials each having a melting point higher than a melting point of an alloy of the first and second materials;
- 25 imagewise exposing the substrate by heating selected adjoining portions of the first and second layers to imaging temperatures exceeding the

melting point of the alloy and thereby causing the first and second layers to melt together to form the alloy in the selected adjoining portions.

- 10 A photomask comprising first and second areas having different optical
5 characteristics from one another, the first areas comprising a plurality of
layers of different inorganic materials, the second areas comprising
contiguous regions of an alloy of the inorganic materials, the alloy having a
melting temperature lower than melting temperatures of the inorganic
materials.
- 10 11. A photomask according to claim 10 wherein the first and second areas have
different etching characteristics.
- 15 12. A photomask according to claim 10 wherein the different inorganic materials
comprise different metals.
- 20 13. A photomask according to claim 10 wherein the alloy has optical
characteristics different from optical characteristics of a topmost one of the
inorganic materials, thus creating a visible image on a surface of the resist
which can be viewed by illumination with optical radiation.
- 25 14. A photomask according to claim 10 wherein the alloy has a melting point
below 300 degrees Celsius.
- 25 15. A photomask according to claim 14 wherein the alloy contains at least 5
percent of one of the inorganic materials.

16. A photomask according to claim 10 wherein the alloy comprises a binary alloy selected from the group consisting of: AsPb, BiCd, BiCo, BiIn, BiPb, BiSn, BiZn, CdIn, CdPb, CdSb, CdSn, CdTl, CdZn, GaIn, GaMg, GaSn, GaZn, InSn, InZn, MgPb, MgSn, MgTl, PbPd, PbPt, PbSb, PbSn, SbTl, SeTl, SnTl, and, SnZn.

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